

CLAIMS

What is claimed is:

1 1. A computer-implemented method for instrumentation of an executable computer
2 program that includes a first bundle of instructions followed by a second bundle, the first
3 bundle having a predicated branch-call instruction followed by a call-shadow instruction,
4 wherein the branch-call instruction conditionally transfers control to a target address in
5 response to a state of an associated predicate and returns control to the second bundle,
6 comprising:

7 changing the predicated branch-call instruction to a predicated branch instruction
8 that targets a fifth bundle, wherein the predicate of the predicated branch instruction is the
9 predicate of the predicated branch-call instruction;

10 creating a third bundle and inserting the third bundle after the second bundle, the
11 third bundle including the call-shadow instruction;

12 creating a fourth bundle and inserting the fourth bundle after the third bundle, the
13 fourth bundle including a branch instruction that targets the second bundle;

14 creating the fifth bundle and inserting the fifth bundle after the fourth bundle, the
15 fifth bundle including a branch-call instruction having a target address equal to the target
16 address of the predicated branch-call instruction; and

17 inserting instrumentation instructions in selected ones of the bundles.

1 2. The method of claim 1, further comprising:

2 identifying each instance of a predicated branch-call instruction followed by a call-
3 shadow instruction;

4 creating respective sets of the third, fourth, and fifth bundles; and

5 changing each predicated branch-call instruction to a predicated branch instruction
6 that targets the respective fifth bundle, wherein a predicate of the predicated branch
7 instruction is the predicate of the predicated branch-call instruction.

1 3. The method of claim 2, further comprising:

2 allocating relocation address space; and

3 storing the respective sets of the third, fourth, and fifth bundles in the relocation
4 address space.

1 4. The method of claim 3, further comprising:
2 identifying in selected functions of the executable program each instance of a
3 predicated branch-call instruction followed by a call-shadow instruction; and
4 creating instrumented versions of the selected function in the relocation address
5 space.

1 5. The method of claim 4, wherein the executable program code occupies a first
2 address space, the method further comprising replacing a first instruction of each of the
3 selected functions in the first address space with a branch instruction to a corresponding
4 instrumented version of the function in the relocation address space.

1 6. The method of claim 1, further comprising:
2 identifying in selected functions of the executable program each instance of a
3 predicated branch-call instruction followed by a call-shadow instruction; and
4 creating instrumented versions of the selected function in the relocation address
5 space.

1 7. The method of claim 6, wherein the executable program code occupies a first
2 address space, the method further comprising replacing a first instruction of each of the
3 selected functions in the first address space with a branch instruction to a corresponding
4 instrumented version of the function in the relocation address space.

1 8. An apparatus for instrumentation of an executable computer program that includes
2 a first bundle of instructions followed by a second bundle, the first bundle having a
3 predicated branch-call instruction followed by a call-shadow instruction, wherein the
4 branch-call instruction conditionally transfers control to a target address in response to a
5 state of an associated predicate and returns control to the second bundle, comprising:
6 means for changing the predicated branch-call instruction to a predicated branch
7 instruction that targets a fifth bundle, wherein the predicate of the predicated branch
8 instruction is the predicate of the predicated branch-call instruction;
9 means for creating a third bundle and inserting the third bundle after the second
10 bundle, the third bundle including the call-shadow instruction;

11 means for creating a fourth bundle and inserting the fourth bundle after the third
12 bundle, the fourth bundle including a branch instruction that targets the second bundle;
13 means for creating the fifth bundle and inserting the fifth bundle after the fourth
14 bundle, the fifth bundle including a branch-call instruction having a target address equal to
15 the target address of the predicated branch-call instruction; and
16 means for inserting instrumentation instructions in selected ones of the bundles.

1 9. A computer-implemented method for instrumentation of an executable computer
2 program that includes a first bundle of instructions having a predicated branch-call
3 instruction followed by a call-shadow instruction, wherein the branch-call instruction
4 conditionally transfers control to a target address in response to a state of an associated
5 predicate and returns control to a second bundle that follows the first bundle, comprising:
6 inserting in the executable program a trampoline code segment that includes a third
7 bundle followed by a fourth bundle, the third bundle including an unpredicated branch
8 instruction having the target address of the predicated branch instruction, and the second
9 bundle having an unpredicated branch having a target address that references the second
10 bundle;
11 changing the target address of the call-branch instruction to reference the first
12 bundle; and
13 inserting instrumentation code in the program whereby the call-branch instruction
14 and the second instruction are stored in different bundles.

1 10. The method of claim 9, further comprising:
2 allocating relocation address space; and
3 storing the trampoline code segment in the relocation address space.

1 11. The method of claim 10, further comprising:
2 identifying each instance of a predicated branch-call instruction followed by a call-
3 shadow instruction; and
4 creating a respective trampoline code segment for each instance of a predicated
5 branch-call instruction followed by a call-shadow instruction.

1 12. An apparatus for instrumentation of an executable computer program that includes
2 a first bundle of instructions having a predicated branch-call instruction followed by a call-
3 shadow instruction, wherein the branch-call instruction conditionally transfers control to a
4 target address in response to a state of an associated predicate and returns control to a
5 second bundle that follows the first bundle, comprising:

6 means for inserting in the executable program a trampoline code segment that
7 includes a third bundle followed by a fourth bundle, the third bundle including an
8 unpredicated branch instruction having the target address of the predicated branch
9 instruction, and the second bundle having an unpredicated branch having a target address
10 that references the second bundle;

11 means for changing the target address of the call-branch instruction to reference
12 the first bundle; and

13 means for inserting instrumentation code in the program whereby the call-branch
14 instruction and the second instruction are stored in different bundles.